

# **ENVIRONMENTAL ASSESSMENT**

## **Cooperative Gypsy Moth Project For Northern Indiana 2006**

by

**Indiana Department of Natural Resources  
Division of Entomology & Plant Pathology**

**Indiana Department of Natural Resources  
Division of Forestry**

**United States Department of Agriculture  
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## 1.0 PURPOSE AND NEED FOR ACTION

### 1.1 Proposed Action

The Indiana Department of Natural Resources (IDNR), Division of Entomology & Plant Pathology and Division of Forestry, proposes a cooperative project with the United States Department of Agriculture (USDA), Forest Service (USFS) to treat the gypsy moth populations at 24 sites in 8 counties that cover an estimated 57,340 acres (Table 1 & see maps in Appendix B). The preferred alternative for the cooperative project is Alternative 5: Btk, mating disruption and/or mass trapping. A state-funded project to treat nine sites by ground treatment is not part of the cooperative project, but it is included in this environmental analysis.

Table 1. Number of Treatment Sites and Acres by County and Treatment Method for 2006 (also see Appendix B).

COUNTY	TREATMENT SITES By Treatment Method			TREATMENT ACRES By Treatment Method		
	Mating Disruption	Btk Aerial	Ground Treatment **	Mating disruption	Btk Aerial	Ground Treatment* *
Allen	3	5	2	33598	3092	<2
Elkhart	0	5	4	0	5796	<4
Kosciusko	1	0	0	645	0	0
LaGrange	0	0	1	0	0	<1
LaPorte	0	1	0	0	389	0
Marshall	0	0	1	0	0	<1
Noble	1	0	1	6111	0	<1
Porter	0	2	0	0	1041	0
St. Joseph	2	1	0	3429	467	0
Whitley	1	2	0	2314	458	0
Cooperative Project by Treatment	8	16	0	46097	11243	0
Total Cooperative Project	24			57340		
State Project by Treatment	0	0	9	0	0	<9

\*\* Ground treatments are not part of the cooperative project.

### 1.2 Project Objective

The objective for this cooperative project is to slow the spread of gypsy moth by eliminating reproducing populations from the proposed treatment sites. Over the past 5 years, the leading edge of gypsy moth populations has not advanced in Indiana while implementing the Slow The Spread Program (STS) (Gypsy Moth Slow The Spread Foundation, Inc., <http://www.gmsts.org>).

### **1.3 Need for Action**

Gypsy moth is not native to the United States, and it lacks effective natural controls. The caterpillars feed on the foliage of many host plants. Oaks are the preferred host species, but the caterpillars defoliate many species of trees and shrubs when oaks are not available. When high numbers of gypsy moth caterpillars are present, forests and trees suffer severe defoliation, which can result in reduced tree growth, branch dieback and even tree mortality. The high numbers of caterpillars also create a substantial public nuisance and can affect human health.

The State of Indiana, with the IDNR, Division of Entomology and Plant Pathology as the lead agency, is dedicated to preserving urban and rural forested habitats from damage by gypsy moth and to enforcing interstate and intrastate quarantines to further protect areas not currently infested by this pest.

If no action is taken, gypsy moth will increase and spread, and defoliation will occur sooner. Therefore, the "no action" alternative is not preferred due to state officials desire to eliminate the isolated infestations, prevent human discomfort associated with infestations, delay damage to local plant communities and reduce spread to adjacent uninfested areas. Local citizens agreed that the "no action" alternative is not preferred through the scoping process (Appendix A).

### **1.4 Decisions to be Made and Responsible Officials**

The preferred alternative in this document proposes cooperative participation of the IDNR and the USFS in treating gypsy moth populations in Indiana. The decision to be made by the responsible USFS official is to choose which of the alternatives presented in this document best fulfills the objectives of the proposed action, and thus the needs of the people of Indiana. In addition, the decision will have to be made as to whether or not any perceived significant environmental impacts could result from the implementation of this project. If there are none, this will be documented in a Decision Notice and FONSI (Finding of No Significant Impact). If significant environmental impacts are found and the project is to continue, an Environmental Impact Statement (EIS) would be prepared.

The alternatives analyzed for this environmental assessment are: 1) No cooperative project (No action), 2) Btk, 3) Mating disruption, 4) Mass trapping, 5) Btk, mating disruption and mass trapping (Preferred Alternative). The responsible USFS official who will make this decision is:

Michael Prouty, Field Representative, USDA, Forest Service, Northeastern Area, 1992 Folwell Avenue, St. Paul, MN 55108, (651)-649-5276.

The responsible officials for the implementation of the cooperative project in the Indiana IDNR are:

Robert D. Waltz, Ph. D., State Entomologist, Indiana Department of Natural Resources, Division of Entomology and Plant Pathology, 402 West Washington Street, IGC South, Room W290, Indianapolis, IN 46204, (317) 232-4120

John Seifert, State Forester, Indiana Department of Natural Resources, Division of Forestry, 402 West Washington Street, IGC South, Room W296, Indianapolis, IN 46204, (317) 232-4105.

## **1.5 Scope of the Analysis**

A final environmental impact statement (FEIS), developed by the USDA, Animal & Plant Health Inspection Service (APHIS) and USFS, entitled Gypsy Moth Management in the United States: a cooperative approach (USDA 1995) was made available in November 1995. The Record of Decision for the FEIS was signed in January of 1996 (USDA 1996), and Alternative 6 was selected, which includes all three management strategies analyzed – suppression, eradication, and slow-the-spread. These strategies depend upon the infestation status of the area: generally infested, uninfested, and transition. Implementation of the FEIS preferred alternative requires that a site-specific environmental analysis be conducted to address local issues before federal or cooperative projects are conducted. This site-specific analysis is tiered to the programmatic environmental impact statement (USDA 1995). As part of the analyses conducted for the FEIS, human health and ecological risk assessments were prepared (Human Health Risk Assessment, Appendix F to the FEIS and Ecological Risk Assessment, Appendix G to the FEIS). The purpose of tiering is to eliminate repetitive discussions of the issues addressed in the FEIS (40 CFR, 1502.20 and 1508.28 in Council on Environmental Quality, 1992).

## **1.6 Summary of Public Involvement and Notification**

Public meetings were held during January and February 2006 (Appendix A). Notices were delivered to elected officials, interested groups, residents and local media. At each meeting, state officials presented alternatives for gypsy moth management. The discussion included identification and biology of gypsy moth, pest impacts, survey methods, and control tactics. The proposed actions and alternatives, including no action, were discussed. Local issues, questions and concerns raised at the public meetings are included in Appendix A.

Information gathered at the public meetings and from resource professionals was used to develop issues and concerns related to the project. They are grouped into two categories; 1) issues used to formulate alternatives, and 2) other issues and concerns.

## **1.7 Issues Used to Formulate the Alternatives**

Each of the major issues is introduced in this section. Discussion pertaining directly to each issue as it relates to the alternatives can be found in Chapter 4.

**Issue 1 - Human Health and Safety.** Three types of risk are addressed under this issue: 1) an aircraft accident during applications, 2) treatment materials and potential effects on people, and 3) the future effects of gypsy moth infestations on people.

**Issue 2 - Effects on Nontarget Organisms and Environmental Quality.** The major concerns under this issue are: 1) the impact of treatment materials to nontarget organisms, including threatened and endangered species that may be in the treatment sites, and 2) the future impacts of gypsy moth defoliation on the forest resources, water quality, wildlife and other natural resources.

**Issue 3 - Economic and Political Impacts of Treatment vs. Non-Treatment.** Gypsy moth outbreaks can have significant economic impacts due to effects on the timber resource, nursery and Christmas tree producers, and recreational activities. An additional economic impact is a gypsy moth quarantine

imposed to regulate movement of products from the forest, nursery and recreational industries to uninfested areas.

**Issue 4 - Likelihood of Success of the Project.** The objective of this project is reducing the spread rate of gypsy moth within Indiana. Alternatives vary in their likelihood of success for the current situation in Indiana. Measurement of project success is important for delaying gypsy moth impacts to Indiana and neighboring states.

## **1.8 Other Concerns and Questions**

Concerns and questions were discussed during the public meetings (see Appendix A). Also, other agencies were consulted (see Appendix C). Information from these sources was used to develop mitigating measures, management requirements and constraints.

## **1.9 Summary of Authorizing Laws and Policies**

**State.** The Division Director (State Entomologist) may cooperate with a person in Indiana to locate, check, or eradicate a pest or pathogen (Indiana Code 14-24-2-1). The Division Director may, on the behalf of the department, enter into a cooperative agreement with the United States government, the government of another state, or an agency of the United States or another state to carry out this article (Indiana Code 14-24-2-2). Aerial applicators must meet Indiana Pesticide Use and Application Law (Indiana Code 15-3-3.6) to provide safe, efficient and acceptable applications of pesticides. The Non-Game and Endangered Species Conservation law (Indiana Code 14-22-34) applies to this project.

**Federal.** Authorization to conduct treatments for gypsy moth infestations is given in the Plant Protection Act of 2000 (7 U.S.C. section 7701 et.seq.).

The Cooperative Forestry Assistance Act of 1978 provides the authority for the USDA and state cooperation in management of forest insects and diseases. The law recognizes that the nation's capacity to produce renewable forest resources is significantly dependent on non-federal forestland. The 2002 Farm Bill (P.L. 107-171d.) reauthorizes the basic charter of the Cooperative Forestry Assistance Act of 1978.

The National Environmental Policy Act (NEPA) of 1969 (P.L. 91-190), 42 USC 4321 et.seq. requires a detailed environmental analysis of any proposed federal action that may affect the human environment. The courts regard federally funded state actions as federal actions.

The Federal Insecticide, Fungicide and Rodenticide Act of 1947, (7 USC 136) as amended, known as FIFRA, requires insecticides used within the United States be registered by the United States Environmental Protection Agency (EPA).

Section 7 of the Endangered Species Act prohibits federal actions from jeopardizing the continued existence of federally listed threatened or endangered species or adversely affecting critical habitat of such species.

Section 106 of the National Historical Preservation Act and 36 CFR Part 800: Protection of Historic Properties requires the State Historic Preservation Officer be consulted regarding the proposed activities.

USDA Departmental Gypsy Moth Policy (USDA 1990) assigns the USFS and APHIS responsibility to assist states in protecting non-federal lands from gypsy moth damage.

## **2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION**

### **2.1 Process Used to Formulate the Alternatives**

Staff entomologists and administration within the IDNR, Division of Entomology and Plant Pathology and the Division of Forestry in cooperation with USDA Forest Service, formulated several alternatives to treat the gypsy moth populations in Indiana under the slow-the-spread strategies (See Chapter 6, Persons and Agencies Consulted).

The FEIS (USDA 1995), which this document is tiered to, allows the USDA to participate in the Cooperative Gypsy Moth Project for Indiana. The USDA can assist in conducting eradication, slow-the-spread and suppression strategies. The FEIS lists the treatment options for each of the strategies (USDA 1995, Vol. II, p.2-15). For the slow-the-spread strategy, the following six treatment options may be considered: 1) *Bacillus thuringiensis* var. *kurstaki* (Btk), 2) diflubenzuron (Dimilin), 3) nucleopolyhedrosis virus (Gypchek), 4) mass trapping, 5) mating disruption (pheromone flakes), and 6) sterile insect release. These treatment options from the FEIS were used as the alternatives for the site-specific analysis of this Environmental Assessment.

### **2.2 Alternatives Eliminated from Detailed Study**

The following alternatives that are available were eliminated from consideration:

**Diflubenzuron (Dimilin).** The label for diflubenzuron (Dimilin) prohibits its use over wetlands and directly to water. Some treatment sites contain lakes, marsh, rivers and/or wetlands. Therefore, its use was not considered for this project. This does not preclude the consideration and use of Dimilin in future projects.

**Gypsy moth specific nucleopolyhedrosis virus (Gypchek).** Gypsy moth nucleopolyhedrosis virus (Gypchek) has a very limited supply and is targeted for use in special areas that have high environmental concerns (e.g., treatment sites that have threatened or endangered species, which could be impacted by other treatment options). There are limited data on the effectiveness of Gypchek in low-level gypsy moth populations. It is preferably used in suppression projects against moderate to high gypsy moth populations (USDA 1995, Vol. II, p. A7). Therefore, NPV is not considered for this project. In future projects, it will be evaluated for use.

**Sterile insect release.** The FEIS documents the use of sterile insects for elimination of isolated gypsy moth populations. It also documents the obstacles of using this alternative - the limited release period; need to synchronize production of sterile pupae and release into the population; and the limited availability. This treatment alternative is currently not available, and it has not been used in recent eradication or slow-the-spread treatment projects. Giving consideration to these obstacles, this alternative was not considered for this project. In future projects, it will be evaluated for use.



## 2.3 Alternatives Considered in Detail

**Alternative 1 - No action.** If no action is taken, the gypsy moth will reproduce and populations will begin to defoliate trees in the area. Gypsy moth populations will develop and spread to surrounding areas. This is not a preferred alternative because damage and regulatory action will occur sooner than if other alternatives are selected.

**Alternative 2 - Btk.** This treatment option uses one or two applications of Btk at 24 to 30 billion international units (BIU) per acre applied from air or ground. The applications would begin when leaf expansion is near 50% and when first and second instar caterpillars are present and feeding. This usually occurs between late April and late May in Indiana. The second application would follow no sooner than four days after the first application. Most commercial formulations of Btk are aqueous flowable suspension containing 48 or 76 BIU/gal. (Appendix D – example of product label). For aerial application at 24 to 30 BIU, less than 3.0 quarts of the product would be applied per acre.

Btk has been a commonly used treatment option in Cooperative Gypsy Moth Projects in Indiana and other states. Btk is a naturally occurring soil-borne bacterium that is mass-produced and formulated into a commercial insecticide. The Btk strain is effective against caterpillars, including the gypsy moth caterpillar. Caterpillars ingest Btk while eating the foliage. Once in the midgut, Btk becomes active and causes death within a few hours or days (USDA 1995, Vol. II, p. A3-A5). Btk may impact nontarget species of spring-feeding caterpillars in the treatment sites, but the impact to the local population is usually very minimal as Btk rapidly degrades on the foliage within a few weeks, and the nontarget lepidopterans generally re-colonize treatment sites in less than 2 years (USDA 1995, Vol. II, p. 4-52 to 4-55). Human exposure to Btk provides little cause for concern, though direct exposure to the spray may cause temporary eye and respiratory tract irritation in a few people (USDA 1995, Vol. II, p. 4-13).

Btk has proven effective at eliminating gypsy moth at all population levels. Btk applications can meet the project objective of eliminating gypsy moth populations from all of the proposed treatment sites.

**Alternative 3 - Mating disruption.** This treatment option uses one aerial application of pheromone flakes prior to the emergence of male moths. This would occur in mid-June to early July. Mating disruption relies on the attractive characteristics of the gypsy moth sex pheromone, disparlure. The objective of mating disruption is to saturate the treatment area with enough pheromone sources to confuse the male moths and prevent them from finding and mating with female moths. Mating disruption is considered specific to gypsy moth and is not known to cause impacts to nontarget organism populations, water quality, microclimate, or soil productivity and fertility (USDA 1995, Vol. II, p. 4-67).

Mating disruption involves the aerial application of plastic flake dispensers that are impregnated with the gypsy moth pheromone. The formulation of Disrupt II (see Appendix D – example of product labels) consists of small plastic flakes, approximately 1/32 inch x 3/32 inch (1 x 3 mm) in size, thus the name “pheromone flakes”. A sticker, Monsanto's Gelva 2333, is applied to the flakes as they are dispersed from the aircraft, which aids in the distribution of the flakes throughout all levels in the forest canopy where mating could potentially occur. The flakes are green in color and applied at a rate of 6 or 15 grams active ingredient (disparlure) per acre. At the high rate of 15 grams, 85 grams of flakes are applied in 2 fluid ounces of sticker per acre (2 flakes per sq.ft.) (Reardon et al. 1998). All of the

ingredients in the Gelva 2333 sticker are considered non-hazardous to public health if used as an additive in the insecticide formulation (40 CFR 180.1001).

Pheromone flakes have proven effective at eliminating gypsy moth at very low population levels. The application of pheromone flakes can meet the project objective of eliminating gypsy moth populations from most of the proposed treatment sites.

**Alternative 4 - Mass trapping.** This treatment option places gypsy moth traps at a close spacing within the treatment sites. “The objective of this treatment is to capture male gypsy moths before they have a chance to locate and mate with female moths” (USDA 1995, Vol II, p. A-7). “For mass trapping, delta or milk carton traps are deployed in an intensive grid pattern in an infested area and an adjacent buffer area at the rate of at least 9 traps per acre” (USDA 1995, Vol. II, p. A-8). Thus, it is very labor intensive, especially over large areas. Typically, mass trapping is used on small infestations of less than 40 acres.

Mass trapping has proven capable of eradicating gypsy moth at very low population levels in isolated introductions. The use of mass trapping can meet the project objective of eliminating gypsy moth populations from some of the proposed treatment sites.

**Alternative 5 - Btk, mating disruption and mass trapping (Preferred Alternative).** The use of this alternative provides flexibility to select Btk, mating disruption, or mass trapping alone or in combination for each site based on the following criteria: 1) gypsy moth population level, 2) habitat type (urban, rural, open water or wetland), 3) nontarget organisms, 4) safety and 5) cost and project efficiency. The use of this alternative can meet the objective of eliminating gypsy moth populations from all of the proposed treatment sites.

## 2.4 Comparative Summary of Alternatives

Table 2. Summary of Environmental Consequences for Alternatives by Issues from Chapter 4

	<b>Issue 1</b> Human Health & Safety (p. 16-17)	<b>Issue 2</b> Effects on Nontarget Organisms & Environmental Quality (p. 17-19)	<b>Issue 3</b> Economic and Political Impacts (p. 19-20)	<b>Issue 4</b> Likelihood of Success of the Project (p. 20)
<b>Alternative 1</b> <b>No Action</b>	<ul style="list-style-type: none"> <li>- No risk of an aircraft accident or spill.</li> <li>- No risk of Btk contact with humans.</li> <li>- Gypsy moth outbreaks will occur sooner with the associated nuisance and health impacts to humans.</li> </ul>	<ul style="list-style-type: none"> <li>- No direct effect to nontarget organisms, including threatened and endangered species.</li> <li>- Future gypsy moth impacts will occur sooner, which includes defoliation and reduction in the oak component of forest stands.</li> </ul>	<ul style="list-style-type: none"> <li>- Regulatory action would occur sooner.</li> <li>- Spread of gypsy moth through these counties and into adjacent counties would not be slowed.</li> </ul>	<ul style="list-style-type: none"> <li>- Gypsy moth would not be eliminated from treatment sites and project objective would not be met.</li> </ul>
<b>Alternative 2</b> <b>Btk</b>	<ul style="list-style-type: none"> <li>- Slight risk of aircraft accident and pesticide spill.</li> <li>- Contact with Btk may cause mild and temporary irritation (eye, skin &amp; respiratory) to a few people.</li> <li>- Delay effect of gypsy moth outbreaks on humans.</li> </ul>	<ul style="list-style-type: none"> <li>- Direct impact on spring feeding caterpillars, temporary reduction in local populations.</li> <li>- No effect to Karner blue butterfly and Mitchell's satyr as neither species occur in or near treatment sites.</li> <li>- No impact to forage base of bald eagle &amp; copperbelly watersnake.</li> <li>- Adverse effect on Indiana Bat is unlikely.</li> <li>- Delay the impact of gypsy moth defoliation on environmental quality.</li> </ul>	<ul style="list-style-type: none"> <li>- Regulatory action would not be implemented in these counties during the current year.</li> <li>- Slows the spread of gypsy moth.</li> </ul>	<ul style="list-style-type: none"> <li>- Success is likely in the treatment sites.</li> </ul>
<b>Alternative 3</b> <b>Mating disruption</b>	<ul style="list-style-type: none"> <li>- Slight risk of aircraft accident.</li> <li>- No effect to human health.</li> <li>- Delay effect of gypsy moth outbreaks on humans.</li> </ul>	<ul style="list-style-type: none"> <li>- No effect to nontarget organisms, including threatened and endangered species.</li> <li>- Delay the impact of gypsy moth defoliation on environmental quality.</li> </ul>	<ul style="list-style-type: none"> <li>- Regulatory action would not be implemented in these counties during the current year.</li> <li>- Slows the spread of gypsy moth.</li> </ul>	<ul style="list-style-type: none"> <li>- Success is likely in small treatment sites with very low populations.</li> </ul>
<b>Alternative 4</b> <b>Mass trapping</b>	<ul style="list-style-type: none"> <li>- No risk of aircraft accident or spill.</li> <li>- No risk of Btk contact with humans</li> <li>- No effect to human health</li> <li>- Delay effects of gypsy moth outbreaks on humans.</li> </ul>	<ul style="list-style-type: none"> <li>- No effect to nontarget organisms, including threatened and endangered species.</li> <li>- Delay the impact of gypsy moth defoliation on environmental quality.</li> </ul>	<ul style="list-style-type: none"> <li>- Regulatory action would not be implemented in these counties during the current year.</li> <li>- Slows the spread of gypsy moth.</li> <li>- Cost is prohibitive in large treatment sites.</li> </ul>	<ul style="list-style-type: none"> <li>- Success is likely in the treatment sites with very low populations.</li> </ul>
<b>Alternative 5</b> <b>Btk, Mating disruption and mass trapping</b>	<ul style="list-style-type: none"> <li>- Same as alternative 2, 3 or 4 depending on the treatment at each site.</li> </ul>	<ul style="list-style-type: none"> <li>- Same as alternative 2, 3 or 4 depending on the treatment at each site.</li> </ul>	<ul style="list-style-type: none"> <li>- Regulatory action would not be implemented in these counties during the current year.</li> <li>- Slows the spread of gypsy moth.</li> </ul>	<ul style="list-style-type: none"> <li>- Success is likely in the treatment sites.</li> </ul>

### **3.0 AFFECTED ENVIRONMENT**

#### **3.1 Description of the Proposed Treatment Sites**

**Allen County:** There are approximately 422,400 acres in Allen County and 41,200 acres of forest that contain both favorable and unfavorable host species.

**Arcola MD 06:** The proposed treatment site contains 2,319 acres. The site is composed of woodlots and trees associated with rural residences. Oak, maple, ash, hickory, other hardwoods, conifers and shrubs are present. The site was detected in 2004 and delimited in 2005. The survey identified a very low population in the overall site and one low population within the site (Arcola Core 06). Mating disruption using pheromone flakes is proposed for the site because of the very low population. A state project using ground treatment is proposed for the Arcola Core 06 site.

**Fort Wayne MD 06:** The proposed site contains 6,341 acres. The site is an urban residential area of Fort Wayne. The urban forest is oaks, ash, elm, maple, other hardwoods, shrubs and conifers. Houses and a school occur in the site. Cell, power line and radio towers are near the site. The site includes the 2004 Parkview Btk site and the 2005 Fort Wayne East Btk site. The survey identified a very low population in the overall site and two low gypsy moth populations within the site (Fort Wayne East Btk 06 and Fort Wayne West Btk 06). Mating disruption using pheromone flakes is proposed for the site because of the very low population. Btk is proposed for the Fort Wayne East Btk 06 and Fort Wayne West Btk 06 sites.

**Fort Wayne East Btk 06:** The proposed site contains 265 acres. The site is an urban residential area of Fort Wayne. The urban forest is oaks, ash, elm, maple, other hardwoods, shrubs and conifers. Houses, businesses, schools, and medical facilities occur in the site. Cell, power line and radio towers are in or adjacent to the site. The site also contains the Mengerson Nature Preserve. The site was detected in 2004 and delimited in 2005. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk are proposed for the site because the population is above the threshold for application of mating disruption.

**Fort Wayne West Btk 06:** The proposed site contains 276 acres. The site is an urban residential area of Fort Wayne. The urban forest is oaks, ash, elm, maple, other hardwoods, shrubs and conifers. Houses and businesses occur in the site. Cell, power line and radio towers are in or adjacent to the site. The site includes an area of the 2005 Fort Wayne East Btk site. The 2005 delimit survey detected gypsy moth in the 2005 Fort Wayne East Btk Site. Eggmasses were detected in the site in 2005. The survey indicates a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Northwest Allen MD 06:** The proposed site contains 24,938 acres. The site is composed of woodlots, and trees associated with rural residences. Oak, maple, ash, elm, sycamore, other hardwoods, shrubs and conifers are present. State highway 3 runs through the site and the town of Huntertown is in the southern part of the site. Also in the site are Rodenbeck Nature Preserve, Bicentennial Woods Nature Preserve, Barrett Oak Hill Nature Preserve, and a segment of the state designated Cedar Creek Natural and Scenic River. Ditches, creeks and ponds are scattered throughout the

site. High voltage lines, cell towers and schools occur in the site. The eastern side of the site includes an area of the 2004 Northern Allen County mating disruption site. The site was detected in 2004 and delimited in 2005. The survey identified a very low population in the site. Mating disruption using pheromone flakes is proposed for the site because of the very low population.

**Ege Btk:** The proposed site contains 319 acres. The site is composed of woodlots and trees associated with rural residences. Oak, maple, ash, elm, other hardwoods, shrubs and conifers are present. State Highway 205 runs through the northern part of the site. Ditches and creeks run through the site. The site was detected in 2004 and delimited in 2005. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Huntertown North 06:** The proposed site contains 1,434 acres. The site is composed of woodlots and trees associated with rural residences, subdivisions and farmland. Oak, maple, hickory, ash, elm, other hardwoods, shrubs and conifers are present. The 2005 Sheriff's Dept Btk site is in the southern corner of the site. A health center is in the southern corner of the site. Cell and water towers and power line towers are present in the site. The site was detected in 2004 and delimited in 2005. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Huntertown South 06:** The proposed site contains 798 acres. The site is residential subdivisions on the northwest side of Fort Wayne. The urban forest is composed of oaks, maples, other hardwoods, shrubs and conifers. The 2004 Pine Valley Btk site is within this site. The Pine Valley Golf Course is in the center of the site and reported defoliation on a few oaks on the course, which was confirmed by aerial and ground survey. The surveys indicate a low/moderate gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Elkhart County:** There are approximately 299,400 acres in Elkhart County and 28,500 acres of forest that contain both favorable and unfavorable host species.

**County Rd 4 & 11:** The proposed site contains 210 acres. The site is forest and trees associated with rural subdivisions and residences. The trees include maple, oak, elm, ash, other hardwoods, shrubs and conifers. Simonton Lake is outside the west boundary of the site. The site was detected in 2004 and delimited in 2005. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Hively Road:** The proposed site contains 944 acres. The site is an urban residential area of Elkhart. The urban forest contains maple, oak, elm, ash, other hardwoods, shrubs and conifers. Houses, business, and schools are in the site. Cell, water and radio towers are in or adjacent to the site. The site was detected in 2004 and delimited in 2005. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Osceola-Elkhart North:** The proposed site contains 1,008 acres. The site is the western side of the city of Elkhart. The site includes residences, businesses, factories, hospitals, schools, churches, and parks. The urban forest consists of maples, oaks, ash, elm, sycamore, other hardwoods and conifers. The St. Joseph River is the south border for the site and separates the site from Osceola-Elkhart South site. U.S. Highway 20 runs through the site. Cell phone and water towers occur in and adjacent to the site. The Elkhart City airport is northeast of the site. The site was detected in 2004 and delimited in 2005. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Osceola-Elkhart South:** The proposed site contains 3,551 acres. The site is the western side of the city of Elkhart. The site includes residences, businesses, factories, hospitals, schools, churches, and parks. The urban forest consists of maples, oaks, ash, elm, sycamore, other hardwoods and conifers. The St. Joseph River is the north border for the site and separates the site from Osceola-Elkhart North site. A railroad and U.S. Highway 33 run through the center of the site. An airport is in the southern part of the site. The Elkhart City airport is northeast of the site. Cell phone and water towers occur in and adjacent to the site. The site was detected in 2004 and delimited in 2005. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Wakarusa:** The proposed site contains 83 acres. The site is urban to rural residences located along two county roads and woodlots. The residences and woodlots are composed of oak, maple, ash, elm, shrubs and other hardwood species. The site was detected in 2004 and delimited in 2005. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Kosciusko County:** There are approximately 384,800 acres in Kosciusko County, and 42,000 acres of forest that contain both favorable and unfavorable host species.

**Lake Wawasee 06:** The proposed site contains 645 acres. The site is an urban forest on the southwestern shores of Lake Wawasee. The site is composed of residences, retail businesses, factories, churches and cottages. The urban forest is composed of maple, ash, oak and other hardwoods. Lake Wawasee forms the north border of the site. One wetland is present on the western border of the site. The eastern side of the site was treated in 2004 with mating disruption. The core of this site was detected in 2004 and delimited in 2005. Eggmasses were not detected in the site. The survey identified a very low population in the site. Mating disruption using pheromone flakes is proposed for the site because of the very low population.

**LaPorte County:** There are approximately 392,400 acres in LaPorte County and 59,500 acres of forest that contain both favorable and unfavorable host species.

**Springville:** The proposed treatment site contains 389 acres. The site is rural forests, farmland, an industry and residences. The forest contains oaks, hickory, maple, ash, elm and other hardwoods.

State Highway 39 runs through the site. The site was detected in 2002, delimited in 2003, treated in 2004 and delimited in 2005. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Noble County:** There are approximately 267,300 acres in Noble County, and 31,400 acres of forest that contain both favorable and unfavorable host species.

**Chain O' Lakes:** The proposed treatment site contains 6,111 acres. This site contains a state park, woodlots and trees associated with rural residences. The forest is composed of oak, maple, ash, elm, pine, cherry, and other hardwoods. The state park is largely forested, but also contains open prairies, several lakes, open fields and cropland. The state park contains campgrounds, cabins, hiking trails, lakes, other recreational areas, a beach and a State Department of Corrections facility. There is a high voltage line on the northeast corner of the treatment site. State highway 9 runs through the site. Sanford Lake is in the southwest corner of the site. Cell and communication towers are in or near the site. The site includes the 2003 Chain O' Lakes mating disruption site, the 2004 and 2005 Merriam and 300 South Btk sites. The 2005 survey identified a very low population in the site. Mating disruption using pheromone flakes is proposed for the site because of the very low population.

**Porter County:** There are approximately 333,700 acres in Porter County and 29,000 acres of forest that contain both favorable and unfavorable host species.

**Cobbs Corner 06:** The proposed treatment site contains 132 acres. The rural site contains woodlots, rural residences and a church. Trees include oaks, maples, ash, elm, other hardwoods and conifers. The site was detected in 2002, delimited in 2003 and 2004. The site was treated with Btk in 2004 (63 acres) and 2005 (69 acres). Wet weather during these treatments is believed to have impacted the treatment success. The 2005 delimit survey detected gypsy moth. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Portage:** The proposed treatment site contains 909 acres. The site is suburban with forests and wooded subdivisions. Businesses, schools and county parks are in the site. The Indiana Turnpike and two railroad corridors run through the site. The forests consist of oaks, maples, hickories, elms, ash and other hardwoods. The northeastern part of the site was in the 2004 Crisman Btk site. The core of Portage site was detected in 2004 and delimited in 2005. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**St. Joseph County:** There are approximately 294,900 acres in St. Joseph County, and 22,100 acres of forest that contain both favorable and unfavorable host species.

**Darden Road 06:** The proposed treatment site contains 413 acres. The site is rural forests, trees associated with rural residences and farmland. The forest is composed of oak, maple, elm, hickory and other hardwoods. The Indiana Toll Road runs through the site. The site was detected in 2004 and delimited in 2005. Eggmasses were not detected in the site. These surveys indicate a very low population, and mating disruption using pheromone flakes is proposed.

**Lilac Road MD:** The proposed treatment site contains 3,016 acres. The site is suburban residential and contains houses, businesses, churches and a county park. The site is north of South Bend and is part of the metropolitan area around South Bend. The north border of the site is the Indiana-Michigan border. The St. Joseph Rivers runs through eastern side of the site. The Indiana Toll Road runs through the southwest corner of the site. The suburban forest is mainly oak mixed with maple, black walnut, black cherry, other hardwoods, conifers and shrubs. The western side of the site is in the 2005 Brick and Auten Road Btk site. The survey identified a very low population in the overall site and one low gypsy moth population within the site (Lilac Road Btk). Mating disruption using pheromone flakes is proposed for the site because of the very low population. Btk is proposed for the Lilac Road Btk site.

**Lilac Road Btk:** The proposed treatment site contains 467 acres. The site is suburban forested residential and forest. The site contains a county park. The site is north of South Bend and is part of the metropolitan area around South Bend. The north border of the site is the Indiana-Michigan border. The St. Joseph Rivers runs through eastern side of the site. The suburban forest is mainly oak mixed with maple, black walnut, black cherry and other hardwoods. The site was detected in 2004 and delimited in 2005. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Whitley County:** There are approximately 218,200 acres in Whitley County, and 27,800 acres of forest that contain both favorable and unfavorable host species.

**Churubusco 06:** The proposed treatment site contains 371 acres. This site is within the city limits of Churubusco. The site contains residences, businesses, city park, schools and a forested area. The city park has mature oak trees. The residential area of the site contains oak, hickory, maple, spruce, pine, and shrubs. The site also contains a forest composed of oak, hickory and other hardwoods. There are cell, water and light towers within the site. The site was detected in 2002, treated with Btk in 2003 (45 acres) and 2004 (56 acres), and delimited in 2005 to an area of 371 acres. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**County Road 300 South & 650 East 06:** The proposed treatment site contains 87 acres. The site is trees associated with rural residences and a woodlot. The trees include oak, maple, hickory, elm, ash and other hardwoods. State Highway 205 runs through the site. The site was detected in 2003 and delimited in 2004 and 2005. Eggmasses were detected in the site in 2005. The surveys indicate a low gypsy moth population and Btk is proposed for the site because the population is above the threshold for application of mating disruption.

**Lincoln Way:** The proposed treatment site contains 2,314 acres. The site is forest and trees associated with rural residences and farmland. The trees include oak, maple, hickory, elm, willow, other hardwoods and conifers. There is a cell tower and industrial park in or near the site. The southern part of the site is in the 2005 Lincoln Way Btk site. The site was detected in 2004 and



delimited in 2005. The survey identified a very low population in the site. Mating disruption using pheromone flakes is proposed for the site because of the very low population.

### **3.2 Threatened and Endangered Species**

Consultation with the staff of the U.S. Fish and Wildlife Service determined that neither of the federally endangered species Karner blue butterfly (*Lycaeides melissa samuelis*) and Mitchell's satyr butterfly (*Neonympha mitchellii*) are known to occur within or adjacent to the sites proposed for treatment using Btk, except for the Portage site in Porter County. The Portage site is within one mile of the Indiana Dunes National Lakeshore, which has populations of Karner blue butterfly. The U.S. Fish & Wildlife Service requests that "aerial spraying of Btk at the Portage site be conducted in a manner that will avoid any drift into the Karner blue butterfly populations areas." "Treatment with Disrupt II pheromone flakes, which is considered to highly specific for gypsy moths, will have no adverse impacts on the federally listed butterflies." (Appendix C – U.S. Fish & Wildlife Letter).

The treatment sites are within the range of the federally endangered Indiana bat (*Myotis sodalis*), bald eagle (*Haliaeetus leucocephalus*) and copperbelly watersnake (*Nerodia erythrogaster neglecta*). The U.S. Fish & Wildlife does "not anticipate adverse effects on copperbelly water snake or bald eagles from any treatments at this time, because both species' forage base consists mainly of vertebrates." For Indiana bat, the proposed treatment site is not near hibernacula, but the site is within the summer habitat. The U.S. Fish & Wildlife indicates the "link between loss of a lepidopteran forage base for Indiana bats and adverse effects on the species is uncertain, therefore at this time we consider the likelihood of take to be discountably small. However, to minimize impacts on foraging Indiana bats we recommend that aerial spraying at the listed sites above be conducted as early as possible in the season." The U.S. Fish & Wildlife "concludes that the federally assisted 2006 gypsy moth program is not likely to adversely affect any of these federally listed species, ..." (Appendix C – U.S. Fish & Wildlife Letter).

The IDNR, Environmental Unit reviewed the project. They identified one nature preserve in one Btk site and another nature preserve within one mile of another Btk site. They have concern for impacts to native lepidopteran at this location, but have no documented occurrence of any rare species in these nature preserves. The Unit stated, "However, the devastating effects of uncontrolled gypsy moth infestations are well documented. At this time, no harm to state or federal listed species, resulting from the proposed control measures, is known or anticipated. The potential harm from the project is less than the potential harm to these same species from an uncontrolled gypsy moth infestation." (Appendix C – IDNR, Early Coordination/Environmental Assessment).

### **3.3 Protection of Historic Properties**

The State Historic Preservation Officer did not identify any historic buildings, structures, districts, objects, or archaeological resources listed in or eligible for inclusion in the National Register of Historic Places within the probable area of potential effects. Nor did the Officer identify any historic properties that will be altered, demolished, or removed by the proposed project pursuant to Indiana Code 14-21-1-18. (Appendix C – IDNR Letter Division of Historic Preservation and Archaeology).

## 4.0 ENVIRONMENTAL CONSEQUENCES

This section is the scientific and analytic basis for the comparison of alternatives. It describes the probable consequences (effects) of each alternative for each issue. Environmental consequences are summarized in Table 2 for each combination of the alternatives and issues.

### 4.1 Human Health and Safety (Issue 1).

**Alternative 1 – No action.** For this alternative, there would be no cooperative project, therefore risk of human contact with pheromone flakes or Btk and an aircraft accident during application would not exist. However, future impacts by gypsy moth to human health will occur sooner under Alternative 1 than if treatments are used to slow-the-spread of these gypsy moth populations. Gypsy moth outbreaks have been associated with adverse human health effects, including skin lesions, eye irritation, and respiratory reactions. Gypsy moth caterpillars can become a serious nuisance that can cause psychological stress in some individuals (USDA 1995, Vol. II, p. 4-9).

**Alternative 2 - Btk.** Human exposure to Btk provides little cause for concern about health effects. “On the basis of both the available epidemiology studies as well as the long history of use, no hazard has been identified for members of the general public exposed to Btk formulations” (USDA 1995, Vol. III, p. 4-15). Exposure to Btk may result in temporary eye, skin, and respiratory tract irritation in a few people. A detailed analysis of the risks posed to humans by Btk was conducted for the FEIS -- Human Health Risk Assessment (USDA 1995, Vol. III). Glare and O’Callaghan provide a comprehensive review of *Bacillus thuringiensis*, including Btk. They conclude with this statement, “After covering this vast amount of literature, our view is a qualified verdict of safe to use.” (Glare and O’Callaghan, 2000)

A slight risk of an accident always exists when conducting aerial applications – Btk uses two applications. To further reduce this risk, a detailed work and safety plan is required prior to program implementation, which outlines guidelines for aircraft inspections, Btk loading, and conditions for safe applications.

The effect of gypsy moth outbreaks on humans would be delayed using this alternative.

**Alternative 3 – Mating disruption.** The toxicity of insect pheromones to mammals is relatively low and their activity is target-specific. Therefore the EPA requires less rigorous testing of these products than of conventional insecticides. Risk to human health due to exposure to disparlure, the active ingredient in pheromone flakes, is discussed in the FEIS (USDA 1995, Vol. II, pp. 4-30 to 4-32). Once absorbed through direct contact, disparlure is very persistent in humans, and individuals exposed to disparlure may attract adult male moths for prolonged periods of time. This persistence is viewed as a nuisance and not a health risk (USDA 1995, Vol. III, 8-1). In acute toxicity tests, disparlure was not toxic to mammals, birds, or fish (USDA 1995, Vol. IV, 5-5) therefore no effects to human health are anticipated.

A slight risk of an accident always exists when conducting aerial applications – mating disruption uses one application. To further reduce this risk, a detailed work and safety plan is required prior to program implementation, which outlines guidelines for aircraft inspections, pheromone flake loading, and conditions for safe applications.

The effect of gypsy moth outbreaks on humans would be delayed using this alternative.

**Alternative 4 – Mass trapping.** The effect of gypsy moth outbreaks on humans would be delayed using this alternative. The human health effects are not anticipated from the use of disparlure in the delta traps (see Alternative 3 above).

**Alternative 5 – Btk, mating disruption, and mass trapping.** The human health and safety consequences stated above for Alternatives 2, 3 and 4 apply to this alternative.

#### **4.2 Effects on Nontarget Organisms and Environmental Quality (Issue 2).**

**Alternative 1 – No action.** With no treatments in the current year, future impacts by the gypsy moth would occur sooner. Defoliation by the gypsy moth will cause selective mortality of preferred host trees. During outbreaks, forest ecosystems can change due to a reduction of the oak component and an increase of tree species that are less desired by gypsy moth, such as maple and ash. Oak forests would likely consist of a more mixed composition in the future, though oak would still be a component.

Gypsy moth defoliation and subsequent tree mortality can affect nontarget organisms by dramatically changing habitats on a local scale. Heavy defoliation can remove food for other leaf-feeding species, including other caterpillars. However, it can also create new habitat for some species by creating snags and increasing understory plant development by increasing light penetration into defoliated areas. Impacts on a larger scale (national, regional, or state) are subtle, gradual, and may be noticeable only after many years or decades (USDA 1995, Vol. II, p. 4-74). Short- and long-term changes in nontarget species have been shown for moderate and heavy defoliation (USDA 1995, Vol. II, p. 4-47 and 4-50). An Ecological Risk Assessment (USDA 1995, Vol. IV) examined gypsy moth impacts on a wide variety of species (mammals, birds, reptiles, amphibians, fish, insects, mollusks, crustaceans, and other invertebrates). Further discussion of gypsy moth and its impact on forest conditions can be found in the FEIS (USDA 1995, Vol. II, p. 4- 41 and 4-74).

**Alternative 2 - Btk.** Btk can have direct and indirect effects on nontarget organisms. Direct toxicity of Btk is generally limited to the larval stage of moth and butterfly species. Btk is not toxic to vertebrates, honeybees, parasitic and predatory insects, and most aquatic invertebrates (USDA 1995, Vol. IV, p. 5-1). Btk has a direct adverse effect on caterpillars of moths and butterflies, but susceptibility varies widely among species. Btk, as used in gypsy moth projects, poses a risk to some spring-feeding caterpillars; however, permanent changes in their populations do not appear likely. An exception may occur in certain habitats that support small isolated populations of a particular species of moth or butterfly that is highly susceptible to Btk (USDA 1995, Vol. II, p. 4-54). The U.S. Fish and Wildlife Service identified two federally endangered butterflies - Karner blue butterfly (*Lycaeides melissa samuelis*) and the Mitchell's satyr butterfly (*Neonympha mitchellii*). However, these species are not known to occur within or adjacent to the sites proposed for treatment using Btk, except for the Portage site in Porter County. The Portage site is within one mile of the Indiana Dunes National Lakeshore, which has populations of Karner blue butterfly. The U.S. Fish & Wildlife Service requests "aerial spraying of Btk at the Portage site be conducted in a manner that will avoid any drift into the Karner blue butterfly populations areas." (Appendix C - U.S. Fish & Wildlife Letter).

Btk may have an indirect effect on other organisms by a reduction in their food resource (e.g. caterpillars, pupae, or adult moths and butterflies). Any effects on vertebrates due to reduction in food availability are probably subtle, especially for mammals and birds that are very mobile. Populations of some gypsy moth parasites and some general lepidopteran parasites may be reduced, due to the reduction in number of potential hosts caused by the Btk spray (USDA 1995, Vol. IV, p. 5-7). The U.S. Fish and Wildlife letter identified that the treatment sites are within the range of the federally endangered Indiana bat (*Myotis sodalis*), bald eagle (*Haliaeetus leucocephalus*) and copperbelly watersnake (*Nerodia erythrogaster neglecta*). They “do not anticipate adverse effects on copperbelly water snake or bald eagles from any treatments at this time, because both species’ forage base consists mainly of vertebrates.” For Indiana bat, they identified five Btk sites with substantial amount of forest habitat. They conclude, “The link between loss of a lepidopteran forage base for Indiana bats and adverse effects on the species is uncertain, therefore at this time we consider the likelihood of take to be discountably small.” “The FWS concludes that the federally assisted 2006 gypsy moth program is not likely to adversely affect any of these federally listed species, subject to the aforementioned concern about avoiding Btk drift toward the karner blue butterfly population at IDNL.”(Appendix C – U.S. Fish & Wildlife Letter).

Applications of Btk formulations do not increase levels of Btk in soil, and Btk persists for a relatively short time in the environment. Changes in soil productivity and fertility are not likely in the treatment sites, because Btk occurs naturally in soils worldwide. Additional information concerning the effects to soil can be found in Appendix G of the FEIS (USDA 1995, Vol. IV).

Application of Btk is likely to maintain the forest condition in the short-term by eliminating gypsy moth populations in the treatment sites, thus delaying gypsy moth from expanding and causing defoliation. In the long-term, gypsy moth will become well established in these counties; even if this alternative is implemented.

**Alternative 3 – Mating disruption.** The pheromone in the flake dispenser is specific to gypsy moth, and it will not affect other insects, including any threatened and endangered species of butterflies or moths.

A quantitative assessment of risk from mating disruption was not conducted for the FEIS because of disparlure’s low toxicity to vertebrates and specificity to gypsy moth. As used in mating disruption, disparlure is not likely to impact nontarget organisms (USDA 1995, Vol. II, p. 4-67). The toxicity of insect pheromones to mammals is relatively low. In acute toxicity tests, disparlure was not toxic to mammals, birds, or fish (USDA 1995, Vol. IV, 5-5). At normal application rates, concentration of the pheromone (disparlure) impregnated in the flakes remains active for one season only. Therefore, no effects on nontarget organisms are anticipated from the proposed Disrupt II application.

Most ingredients in the flakes are insoluble in water, so the risk of disparlure leaching into groundwater is minimal. To determine the amount of disparlure that could potentially leach into water, 50 grams of flakes were submerged in 150 ml of water and vigorously agitated for 24 hours. Results indicate that less than 0.04% of the active ingredient (disparlure) contained in the flakes leached into water under these conditions. Disrupt II is applied at doses of 6 or 15 grams of active ingredient (disparlure) per acre and 90% of the flakes are intercepted by and adhere to the forest canopy, where they remain until they have released most of the disparlure.

Using pheromone flakes to disrupt mating is likely to maintain the forest condition in the short-term by eliminating gypsy moth populations in the treatment sites, thus delaying gypsy moth from expanding and causing defoliation. In the long-term, gypsy moth will become well established in these counties; even if this alternative is implemented.

**Alternative 4 - Mass trapping.** The pheromone in the delta trap is specific to gypsy moth and will not have an effect on other insects or threatened and endangered species of butterflies or moths. “Mass trapping does not affect nontarget organisms, except those (primarily flying insects) that accidentally find their way into the trap.” (USDA 1995, Vol. II, p. A-9).

Mass trapping is likely to maintain the forest condition in the short-term by eliminating gypsy moth populations in the treatment sites, thus delaying gypsy moth from expanding and causing defoliation. In the long-term, gypsy moth will become well established in these counties; even if this alternative is implemented.

**Alternative 5 - Btk, mating disruption, and mass trapping.** The nontarget and environmental consequences stated above for Alternatives 2, 3 and 4 apply to this alternative.

#### **4.3 Economic and Political Impacts of Treatment vs. Non-Treatment (Issue 3).**

**Alternative 1 – No action.** If no treatments were applied, the likely action would be to implement a quarantine in these counties during the next year. A quarantine would regulate movement of firewood, logs, other timber products, mobile homes, recreational vehicles, trees, shrubs, Christmas trees, and outdoor household articles. This would create a financial impact to industries that deal with these products.

If current populations are not treated, they will continue to reproduce and grow in size. Defoliation would become noticeable in the future, but it would be difficult to predict exactly when noticeable defoliation would occur. Requests for federal assistance to suppress gypsy moth would be likely when defoliation occurs. Suppression projects are generally more expensive in total dollars than eradication projects because much larger areas are treated. The economic impact to state budgets would increase, as responsible agencies would need to administer and fund these suppression projects.

Following defoliation, negative financial impacts are likely to occur for recreational industries such as resorts and campgrounds. Homeowners, private woodland owners, and forest-based industries could be impacted by gypsy moth treatment costs, tree mortality, and adverse human health effects.

**Alternative 4 – Mass trapping.** If treatments are applied, regulatory action is not likely for these counties during the next year and the impacts listed under Alternative 1 would be delayed. Mass trapping is typically used in small areas (less than 40 acres) because it is labor intensive (USDA 1995, Vol. II, p. A8-9). Its use for all treatment sites would be cost prohibitive.

**Alternatives 2 (Btk), 3 (Mating disruption) and 5 (Btk, mating disruption, and mass trapping).** If treatments are applied, regulatory action is not likely for these counties during the next year and the impacts listed under Alternative 1 would be delayed.

Economic analysis from the Slow-The-Spread Program (STS) demonstrated the use of Btk, mating disruption and other STS technology reduced the spread of gypsy moth by as much as 60 percent (Sharov et al. 2002, p. 32). The Eastern Plant Board recognized that the benefit of delaying gypsy moth resulted in an economic benefit of \$22.00 for each dollar invested in treatment cost and that the STS Program protected timber, recreation, and private property values (Eastern Plant Board 1997).

#### **4.4 Likelihood of Success of the Project (Issue 4).**

**Alternative 1 – No action.** Project objectives would not be met with this alternative. Gypsy moth would not be eliminated from the treatment sites, and its population would serve as a source for increased spread within the counties and into surrounding counties. If these populations were allowed to increase and expand, gypsy moth could spread through the state in 10 years (Sharov et al. 2002).

**Alternative 2 - Btk.** Project success is likely with this alternative. Btk is effective in eliminating gypsy moth in the treatment sites with low gypsy moth populations.

**Alternative 3 – Mating disruption.** Project success is likely with this alternative in most sites. However, a few sites have gypsy moth populations in core areas above the recommended level for treatment with mating disruption.

**Alternative 4 – Mass trapping.** Project success is likely with this alternative in some sites. However, a few sites have gypsy moth populations in core areas above the recommended level for treatment with mass trapping. Mass trapping is a labor-intensive treatment and sites greater than 40 acres are usually not mass trapped. It would not be feasible to mass trap all treatment sites.

**Alternative 5 - Btk, mating disruption, and mass trapping.** Project success is optimized with this alternative when treatment selection criteria are used to determine the use of Btk, mating disruption or mass trapping alone or in combination for each site. Over the past 4 years, the leading edge of gypsy moth populations (as defined by the 10-moth line) has not advanced in Indiana while implementing the Slow The Spread Program (STS). From the data analysis by the STS Program, the average rate of spread in Indiana during 2002-2005 was calculated to be negative 0.56 miles per year. Treatment selection criteria used to evaluate each site are: 1) gypsy moth population level, 2) habitat type (urban, rural, open water or wetland), 3) nontarget organisms, 4) safety, and 5) cost and project efficiency.

#### **4.5 Unavoidable Adverse Effects**

No unavoidable adverse effects were identified for the proposed project.

#### **4.6 Irreversible and Irretrievable Commitments of Resources**

An irreversible commitment of resources results in the permanent loss of: 1) nonrenewable resources, such as minerals or cultural resources; 2) resources that are renewable only over long periods of time, such as soil productivity; or 3) a species (extinction) (USDA 1995, Vol. II, p. 4-93). Except for Alternative 1, there is an irreversible commitment of labor, fossil fuel, and money spent on the project.

An irretrievable commitment is one in which a resource product or use is lost for a period of time while managing for another (USDA 1995, Vol. II, p. 4-93). For this project, no irretrievable commitments were identified.

#### **4.7 Cumulative Effects**

No cumulative effects were identified for this proposed project. Cumulative effects are the incremental impacts of the action when added to past, present, and reasonably foreseeable future actions, which collectively are significant.

Fifteen sites proposed for treatment in 2006 had treatments in previous years. Two Btk sites, Cobbs Corner (Porter Co.), and Hometown North 06 (Allen Co.) had Btk applied in 2005 to some or all of the site. Four mating disruption sites, Chain O'Lakes (Noble Co.), Fort Wayne MD 06 (Allen Co.), Lilac Road MD (St. Joseph Co.), and Lincoln Way 06 (Whitley Co.) had Btk applied in 2005 to some or all of the site. Six Btk sites, Churubusco 06 (Whitley Co.), Cobbs Corner (Porter Co.), Fort Wayne West Btk 06 (Allen Co.), Hometown South 06 (Allen Co.), Portage (Porter Co.), and Springville (LaPorte Co.) had Btk applied in 2004 to some or all of the site. Three mating disruption sites, Arcola MD 06 (Allen Co.), Chain O' Lakes (Noble Co.), Fort Wayne MD 06 (Allen Co.), had Btk applied in 2004 to some or all of the site. Two mating disruption sites, Lake Wawasee 06 (Kosciusko Co.) and North West Allen MD 06 (Allen Co.), had mating disruption applied in 2004 to some or all of the site. Churubusco (Whitley Co.) also had Btk applied to some of the site in 2003. Chain O'Lakes (Noble Co.) also was treated with mating disruption to some of the site in 2003. Wakarusa had mating disruption applied to some of the site in 2002. Cumulative effects from Btk applications over several years are not anticipated because the treatment sites are generally less than 1000 acres and similar habitats are nearby which have not been treated; thus treatment sites are likely to be re-colonized rapidly (USDA, 1995, Vol. II, p. 4-89 to 4-91). Also, some sites are being retreated with Btk because the treatment from the previous year was impacted by rain; thus, the effects on non-target organisms also would be less. No cumulative effects of the prior treatments are anticipated.

Two sites, Fort Wayne MD 06 and Lilac Road MD are proposed to receive Btk treatment in core areas and mating disruption over the entire treatment site. No cumulative effects are known or expected from these multiple treatments. No gypsy moth treatments by the private sector are expected in the proposed treatment counties during the current year.

#### **4.8 Other Information**

##### **Mitigation**

The Cooperative Gypsy Moth Project will implement the following safeguards and mitigating measures:

- News releases of treatments and dates will be given to local newspapers and radio/TV stations.
- Local safety authority will be notified by direct contact or phone calls.
- Employees of state and federal agencies monitoring the treatment will receive training on treatment methods to be able to answer questions from the public.
- Application of Btk will be suspended when school buses are in the site and when children are outside on school grounds.

- Aircraft will be calibrated for accurate application of treatment material.
- Applications will be timed so the most susceptible gypsy moth stage is targeted.
- Weather will be monitored during treatment to assure accurate deposition of the treatment material.

### **Monitoring**

During the treatments, ground observers and/or aerial observers will monitor the application for accuracy within the block perimeters, swath width, and drift. Application information (e.g. swath widths, spray-on and spray-off, acres treated, and altitude) will be downloaded to an operations-base computer.

The Btk and mating disruption treatment sites will be monitored using gypsy moth traps to determine the effectiveness of the treatments.



## 5.0 LIST OF PREPARERS

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EA Responsibility: Participated in writing and reviewing the environmental assessment and in the development of the proposed cooperative gypsy moth project.

Experience and Education: Experience as Forest Health Specialist since 1974 and experience in gypsy moth management since 1977. M.F., Duke University in Forest Entomology and Pathology; B.A., Catawba College in pre-forestry.

**Dennis Haugen**, Entomologist, USDA Forest Service, Northeastern Area State and Private Forestry, Forest Health Protection, 1992 Folwell Ave., St. Paul, MN 55108.

EA Responsibility: Participated in writing and reviewing the environmental assessment and in the development of the proposed cooperative gypsy moth project.

Experience and Education: Forest entomologist with the USDA Forest Service in St. Paul, MN since 1993. Ph.D., Iowa State University in entomology and forest biology; M.S., University of Arkansas-Fayetteville in entomology; B.S., Iowa State University in forestry and entomology.

## **6.0 LIST OF PERSONS AND AGENCIES CONSULTED**

Kallie Bontrager, Nursery Inspector, IDNR Entomology and Plant Pathology, 402 West Washington Street, Room 290W, Indianapolis, IN 46204. Consultation on treatment sites.

Mike Connor, Forest Entomologist, USDA Forest Service, Forest Health Protection, 1992 Folwell Ave., St. Paul, MN 55108. Review of the Environmental Assessment.

Jon W. Eggen, Environmental Supervisor, Division of Fish and Wildlife, 402 West Washington Street, Room 273W, Indianapolis, IN 46204. Consultation on treatment sites and proposed project.

Scott Kinzie, Nursery Inspector, IDNR Entomology and Plant Pathology, 402 West Washington Street, Room 290W, Indianapolis, IN 46204. Consultation on treatment sites.

Donna Leonard, Entomologist, STS Coordinator, USDA Forest Service, FHP, P.O. Box 2680, Asheville, NC 28802. Consultation on treatment sites and development of cooperative project.

Scott Pruitt, Field Supervisor, US Fish and Wildlife Service, 718 North Washington Street, Bloomington, IN 47404. Threatened and endangered species.

Angela Rust, Nursery Inspector, IDNR Entomology and Plant Pathology, 402 West Washington Street, Room 290W, Indianapolis, IN 46204. Consultation on treatment sites.

Jon Smith, IDNR Historical Preservation and Archaeology, 402 West Washington Street, Room W274, Indianapolis, IN 46204. Historical property of concern.

Zack Smith, Forest Entomologist, IDNR Forestry, 402 West Washington Street, Room 296W, Indianapolis, IN 46204. Consultation on treatment sites and development of cooperative project.

Christie Stanifer, Environmental Coordinator, Environmental Unit, Division of Water, 402 West Washington Street, Room 273W, Indianapolis, IN 46204. Consultation on treatment sites and proposed project.

Robert Waltz, State Entomologist, IDNR Entomology and Plant Pathology, 402 West Washington Street, Room 290W, Indianapolis, IN 46204. Consultation on treatment sites and development of cooperative project

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